Division of Environment
Bureau of Water
Public Water Supply Section
1000 SW Jackson – Suite 420
Topeka, KS 66612

Kansas

Phone: 785-296-5514
Fax: 785-296-5509
www.kdheks.gov

Susan Mosier, MD, Secretary | Department of Health & Environment | Sam Brownback, Governor

June 6, 2016

MR. JOSH KRAMER, EI
KRAMER CONSULTING, LLC
4336 SE 37TH STREET
TOPEKA, KS 66605

Re: Preliminary Engineering Report
Frontenac, City of
PWS ID No's. Federal ID KS2003720 & State ID I5500
KDHE Project No. PW006063
Engineer Project No. 1422

Dear Mr. Kramer:

The engineering report regarding the public water supply system has been reviewed and the analysis and recommendations within the report noted. The report will be kept on file.

Please provide a design memorandum for our review once the details of the design basis have been finalized. As is customary, plans, specifications and a public water supply permit application must be subsequently submitted for our review and approval prior to the start of construction.

Please reference KDHE Project No. PW006063 in any future correspondence regarding this report.

You may contact me at 785-296-5516 or at *dclair@kdheks.gov* if you have any questions or comments pertaining to this project.

Sincerely,

Daniel H. Clair

Daniel Clair, PE
Unit Chief
Engineering & Permits Unit
Public Water Supply Section
Bureau of Water

DHC:lw
pc: Frontenac, City of
Southeast District

KRAMER CONSULTING, LLC

Engineers – Planners – Surveyors

PRELIMINARY ENGINEERING REPORT

WATER SUPPLY, STORAGE
AND
TREATMENT IMPROVEMENTS

FOR

CITY OF FRONTENAC, KANSAS

Job No. 1422 **May 23, 2016**

PRELIMINARY ENGINEERING REPORT

WATER SUPPLY, STORAGE AND TREATMENT IMPROVEMENTS

OWNER:

CITY OF FRONTENAC, KANSAS

ENGINEERS:

KRAMER CONSULTING, LLC
4336 SE 37th Street
Topeka, KS 66605
785-234-6600

Job No. 1422

May 23, 2016

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SECTION I

PLANNING AREA

A. LOCATION

Frontenac is located in southeast Crawford County, Kansas, approximately 32 miles north of the Kansas-Oklahoma border and 4 miles west of the Kansas-Missouri border along U.S. Highway 69. The City of Frontenac is a typical small Kansas community with a population of 3,432 persons. The City covers approximately 5 square miles. The City owns and operates its own water supply, treatment facilities, distribution and storage.

The planning area boundaries for this study coincide with the corporate limits of the City of Frontenac and immediate vicinity. The planning area will be directly benefited by the proposed improvements. An aerial photo, City limits and topographic map of the planning area are shown in Figures I-1, I-2 and I-3, respectively.

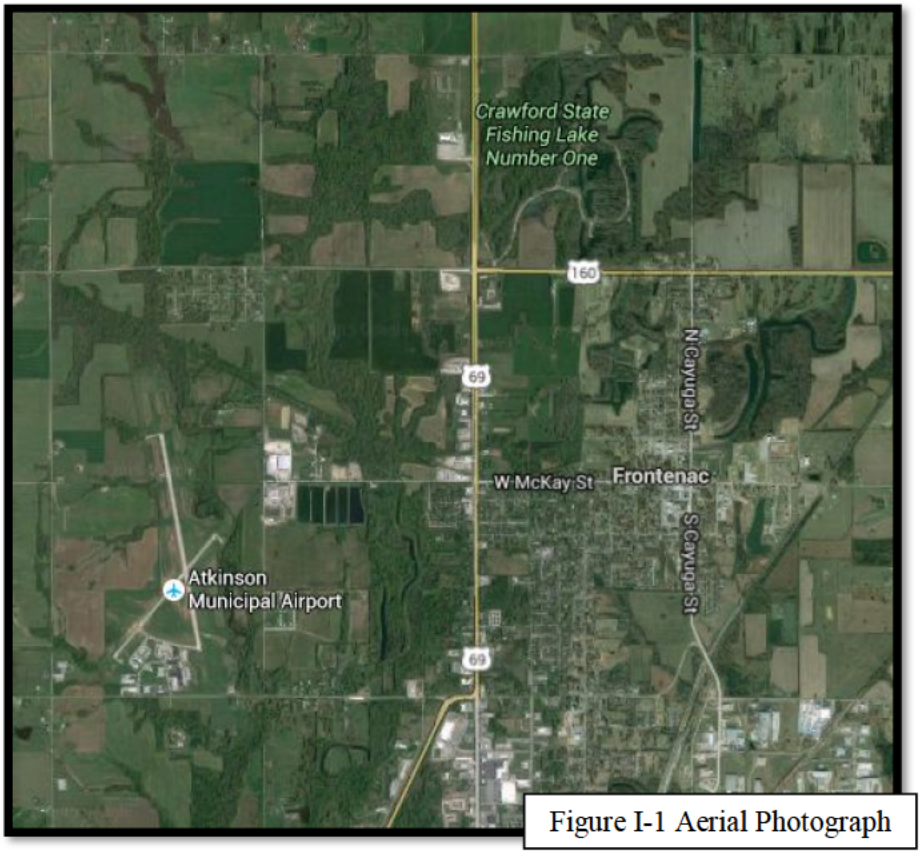


Figure I-1 Aerial Photograph

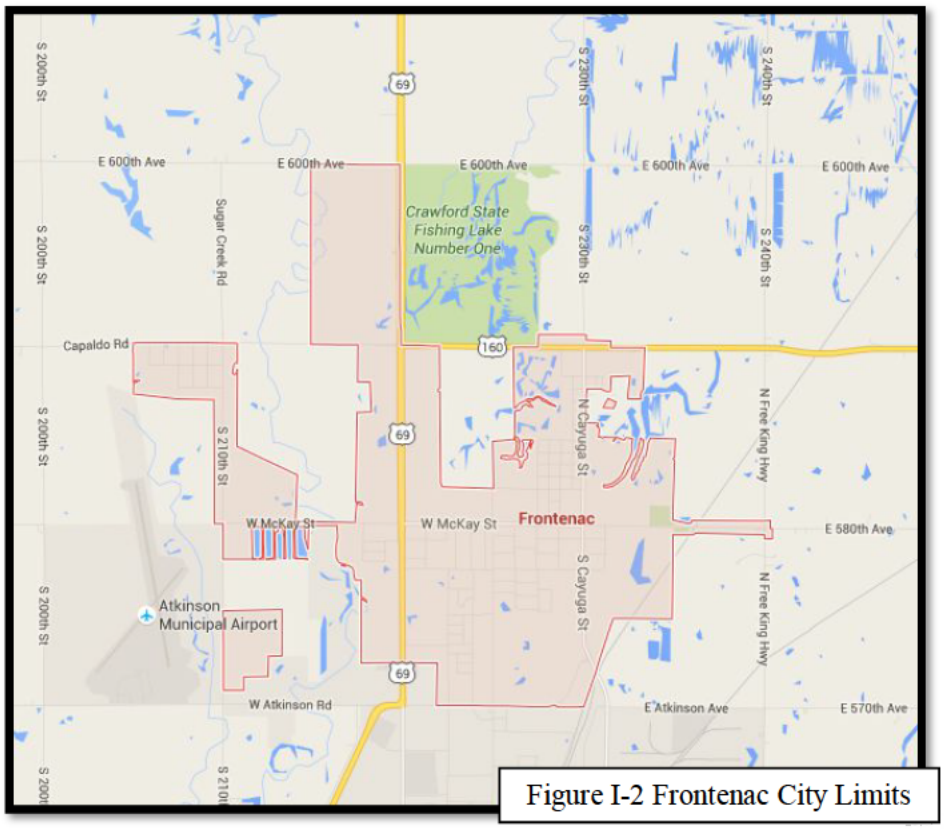


Figure I-2 Frontenac City Limits

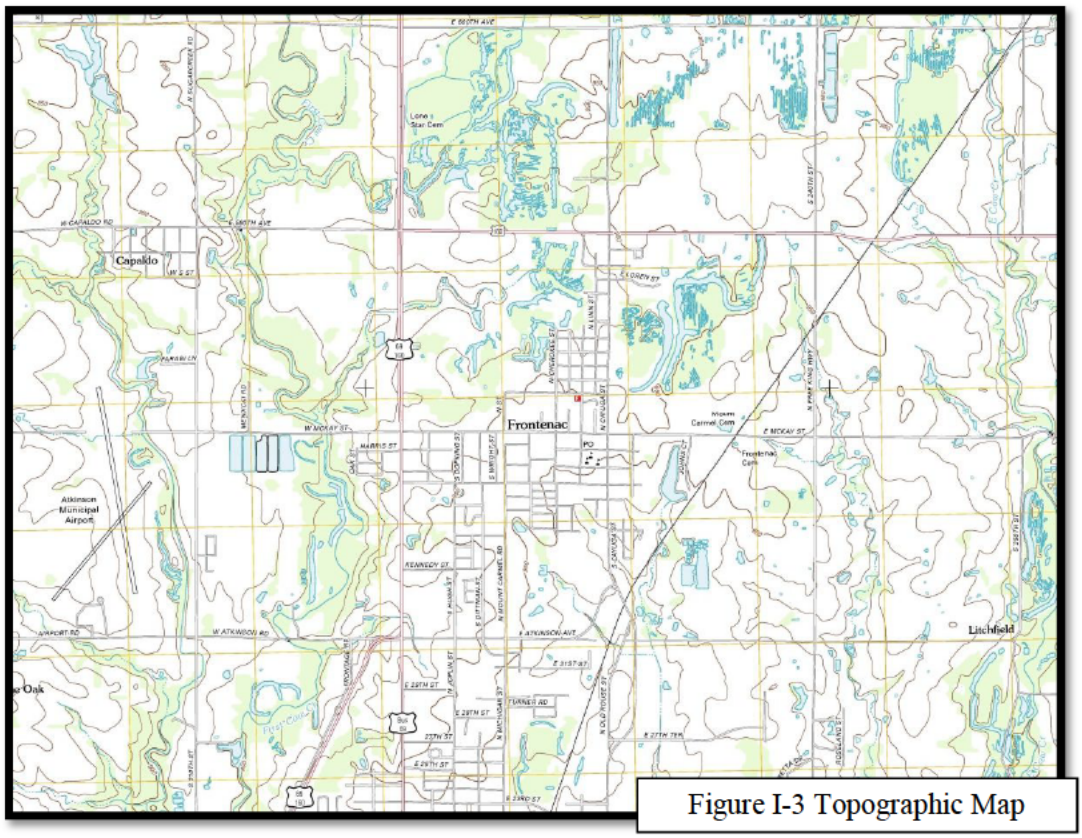


Figure I-3 Topographic Map

B. ENVIRONMENTAL RESOURCES

The area surrounding Frontenac has ranching and agriculture with small farm related businesses located within the City limits. There are two large industries and ten smaller businesses located in the industrial park in the western part of the City. Several other businesses and stores are located in Frontenac. Also, due to the close proximity to Pittsburg State University there are several national technical training centers, such as John Deere and Harley Davidson located in Frontenac. Unified School District No. 249 maintains K-12 schools within the City.

There are no known historic sites, endangered species or critical habitats in the planning area that were identified in the City's Intergovernmental Review done in October of 2006. The review was completed for a water supply, water storage and water distribution system improvement project. The water distribution project has been constructed and the other projects were delayed until now. New environmental reviews will be done for the present project.

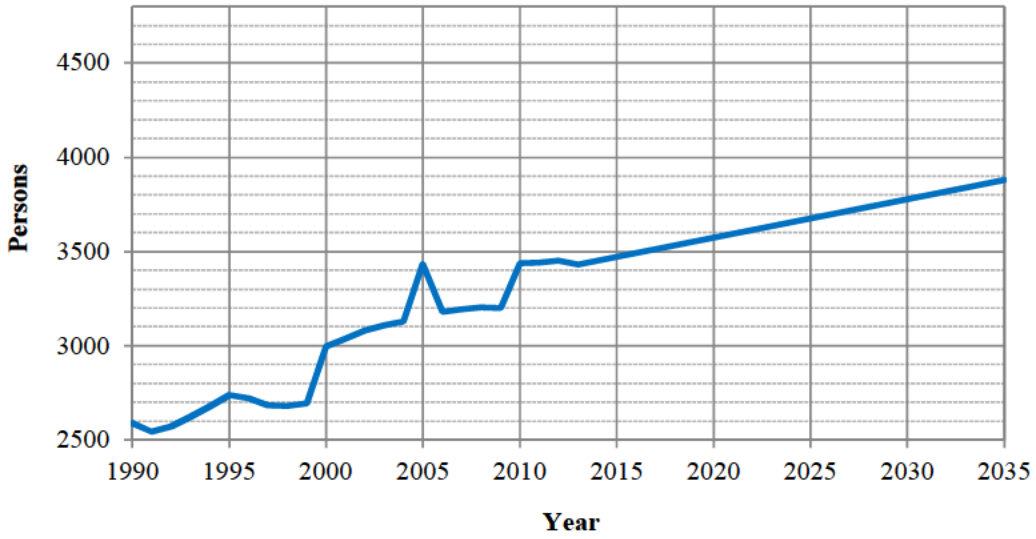
The proposed water improvements will not have a major effect on land uses. The project will improve water supply, storage and treatment for the entire City and insure adequate safe water for future growth in the planning area. Project improvements will have continuing compatibility with the community needs over the planning period.

C. POPULATION

The future population to be served and future development are affected by many indeterminate factors that the prediction of future growth, regardless of the degree of prior study, should be considered as only an approximation. A detailed analysis of population trends from Frontenac and reasons for population change is beyond the need and scope of this study. Data from sources including the U. S. Census records, City Data and Kansas Demographics by Cubit were used to show past population trends and projected population for Frontenac.

Figure I-4

Population Trend in Frontenac



Year	Population
1990	2588
1995	2738
2000	2996
2005	3134
2010	3437
2013	3432
2015	3444
2035	3880

Past population data indicates that Frontenac is gradually increasing in population. For making future water use projections, it is recommended that the population be considered increasing as shown above. Therefore, it is recommended that a design population of 3,880 persons be selected for the design year 2035. This population will allow facilities to serve the present population and provide reasonable growth margin, yet not unduly increase the cost of the project and financial burden on current consumers.

D. COMMUNITY ENGAGEMENT

Water supply and water storage improvements have been discussed at several City council meetings. A public hearing was held to inform the public about water improvements to the water plant and water storage. This hearing was held on December 4, 2006. Additional public hearings are planned to inform the citizens on the proposed 2016 water improvements covered in this report.

* * * * * *

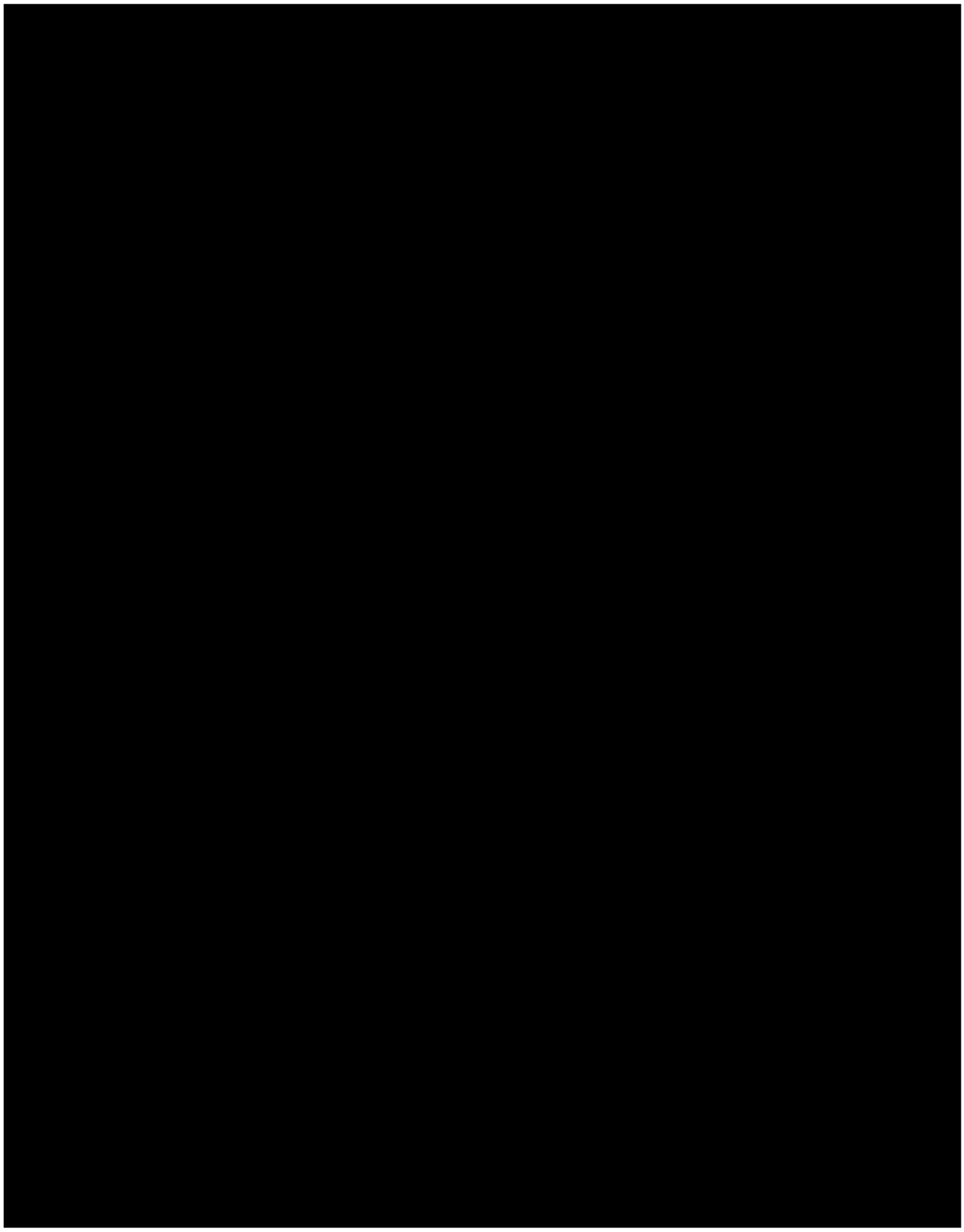
SECTION II

EXISTING FACILITIES

A. LOCATION

Frontenac has three water supply wells, one water treatment plant, one in ground clearwell and two elevated water storage tanks. In addition to these facilities, the City owns its water distribution system. [redacted]

[redacted]



B. HISTORY

1. [redacted]

[redacted]

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[redacted]

	[redacted]		[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]			
[redacted]	[redacted]	[redacted]	[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Table II - 1

Typical Chemical Analysis of Frontenac's Well Water

Expressed in parts per million (ppm)

Component	Well Water Supply	Maximum Contaminant Levels
Total Hardness, as CaC03	240	400
Calcium, as Ca	55	75-200
Magnesium, as Mg	25	50-150
Sodium	100	100
Total Alkalinity, as CaC03	200	60-300
pH	7.8	6.5-8.5
Specific Conductivity	1,060	1,500
Chloride	187	250
Sulfate	35	250
Nitrate, as N03	0	10
Fluoride	1	4
Iron	0	0.03
Manganese	0.002	0.05
Total Dissolved Solids	551	500
Arsenic	0.0002	50
Barium	0.4	2
Selenium	0	0.05
Silica	11.2	50
Aluminum	1	50-200
Potassium	5	100
Phosphorus, total	0.02	5
Zinc	0.008	5
Corrosivity	0.274	0-1.0
Gross Alpha	9	15
Radium 226	3	5.0*
Radium 228	<1.0	0
Hydrogen Sulfide Gas	4.0-11.0	0
Total Trihalomethanes (TTHM)	0.0027	0.08
Haloacetic Acids (HAAS)	0.004	0.06
*Combined Ra226; Ra228		

Revised June 6, 2016

2. Water Treatment Plant

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

to the water as it exits the aerators and before it enters the chlorine contact basin. This basin allows time for the chlorine to react with the hydrogen sulfide remaining in the water and convert it to elemental sulfur, which is insoluble in water. The insoluble elemental sulfur is now small particles and can be removed from the well water by passing the water through rapid sand filters.

The chlorine contact basin overflows into a pipe that enters the four filters inside the water plant building. The water exits the bottom of each filter and flows into the clearwell over a filter effluent weir. Once the clearwell high level is reached, the water plant and the well(s) are automatically turned off.

Principal equipment and components of the water treatment plant are listed as follows:

a) [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

3. Water Distribution System

The existing water distribution system serving the City is constructed of cast iron, asbestos cement, and PVC plastic pipe, which varies in size from ¾-inch to 8-inch and with gate valves for isolating areas of the system. The system has been in operation since early 1900's with several extensions and many line replacements. Water services are metered (1,474 existing meters) and fire hydrants are provided on the distribution system.

A water system improvement project was constructed in 2010 to replace failing asbestos cement pipe. There were 11,500 feet of 8" PVC plastic pipe installed with valves, fire hydrants and new services.

4. Water Storage

Water storage is provided by a 160,000 gallon in ground concrete clearwell at the water treatment plant, a 75,000 gallon elevated water storage tank located at the plant site and a 250,000 gallon elevated water storage tank located on the west side of the City in the Industrial Park. The concrete clearwell was constructed in 1991 as part of the water treatment plant construction. The 75,000 gallon elevated water storage tank was constructed in 1907 and the 250,000 gallon elevated water storage tank in 1980.

The interior of the 250,000 gallon elevated water storage tank was sandblasted, spot repaired and painted in 2008.

C. CONDITION OF EXISTING FACILITIES

1. Water Supply

The City's well water supply is moderately hard water with high sodium and hydrogen sulfide levels. The hydrogen sulfide levels are high enough to be corrosive to piping systems. The water is characterized as "moderately hard" water as it contains 240 parts per million of calcium and magnesium hardness. A desirable level of hardness for municipal water supply with domestic, industrial and commercial uses is 100 to 130 parts per million. KDHE recommends softening when total hardness is over 300 parts per million.

Frontenac's well water is safe to drink with treatment for hydrogen sulfide removal and disinfection. Beyond the basic requirements of public health and safety, the problem of water quality becomes one of economics and the wishes of the consumers. The current water treatment plant removes hydrogen sulfide and provides filtration and disinfection.

[redacted]

[redacted]

2. Water Plant

The water treatment plant has a design rate of 1,050 gpm. The plant building is in good condition, well maintained and kept cleaned and repainted as necessary. However, due to age and unreliable service, the following treatment plant equipment needs to be replaced:

[redacted]

Other plant items that need to be upgraded are as follows:

[redacted]

With new equipment and plant upgrades shown herein the water treatment plant has the capacity and is suitable to serve the planning area through the design year 2035, based on current EPA and KDHE water regulations.

3. Water Distribution System

Based on past reports and recent upgrades to the water distribution system in 2011, no immediate improvements are needed to the water distribution system. The system is adequate and suitable to serve the planning area through the design year 2035. As new areas are developed in the planning area, water line extensions will be needed to serve additional users. Also, the City may replace small sections of the distribution system as the need arises.

4. Water Storage

The 160,000 gallon clearwell at the treatment plant and 250,000 gallon elevated water storage tank are both in good condition, adequate and suitable for service through the design year 2035. The interior and exterior of the elevated tank may need painted and/or spot repairs of paint within the design period.

In April 2006, the 75,000 gallon water storage tank at the water plant site was inspected and the following recommendations were made:

1. [redacted]

[redacted]

D. FINANCIAL STATUS OF EXISTING WATER UTILITY

1. Water Rates

The present water rates charged by the City of Frontenac are adequate to provide the revenue needed to operate the City's water utility.

Water rates are shown in Water and Sewer Ordinance No. 2014-07. This ordinance took affect January 14, 2015. A copy of the ordinance is in Appendix C of this report.

Based on the present water rates, Table II - 2 shows charges for various amounts of water used.

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Table II - 2

Water Use Charges

Residential Within City Limits	**Water Service Charge**
First 2,000 gallons, minimum charge	$12.88
Per 100 gallons above minimum	$0.432
Total for 5,000 gallons	$25.84
Total for 10,000 gallons	$47.44

Residential Outside City Limits	**Water Service Charge**
First 2,000 gallons, minimum charge	$17.59
Per 100 gallons above minimum	$0.547
Total for 5,000 gallons	$34.00
Total for 10,000 gallons	$61.35

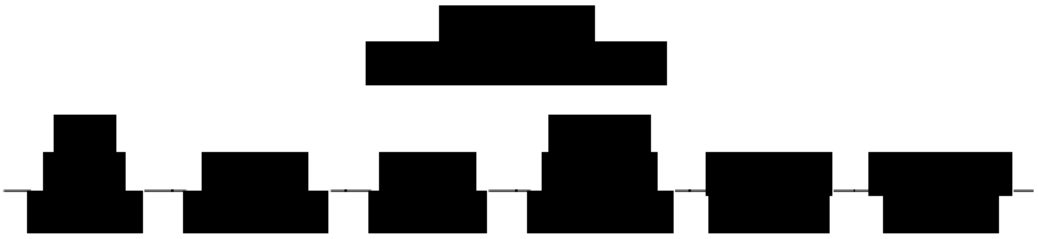
All Businesses	**Water Service Charge**
First 2,000 gallons, minimum charge	$18.30
Per 100 gallons above minimum	$0.483
Total for 5,000 gallons	$32.79
Total for 10,000 gallons	$56.94

2. Detailed Breakdown of Annual Expenses, Incl. O & M Cost

A breakdown of existing Water Utility Expenses from the 2016 Budget are shown in the following Table II – 3.

3. Long-Term Debt

Frontenac's water utility has one outstanding bond debt. In 2013, the City refinanced with a General Obligation (G.O.) Bond to consolidate several higher interest bonds. Water utility loans were included in this bond. Information on the G.O. Bond is shown in the following Table II - 4. Frontenac is budgeted to pay $100,000 in 2016 towards the payment of this bond.



4. Water Use

Past Frontenac water use data from Municipal Water Use Reports for the last 5 years is shown in the following Table II – 5:

Table II - 5

Water Use in 1,000 Gallons

Year	Raw Water	Water Sold	Free Water	Water Loss	% Loss	No. of Meters
2014	116,122	92,775	7,491	15,856	13.6	1,491
2013	115,949	96,704	6,938	12,307	10.6	1,483
2012	123,924	101,511	7,792	14,621	11.7	1,481
2011	130,064	107,056	7,232	15,776	12.1	1,514
2010	118,634	102,465	6,270	9,915	8.3	1,506

The average water loss over the last 5 years is 11.3%. This number is calculated by reading the raw water meter at the plant each month and subtracting the water sold and free water amounts. This unaccounted for water is moderate, but it has been reduced from 24% in 1999.

The City does not keep track of monthly water usage categories of users. Based on water sold to residential water users (1,475 users as of October 2015), the average water use in 2014 per user

was 5,242 gallons per month. Number of users includes residential, commercial and pasture meters, but not 16 City meters which receive free water.

* * * * * *

SECTION III

NEED FOR PROJECT

A. HEALTH, SANITATION AND SECURITY

1. Water Supply

The City's well water supply is moderately hard water with high sodium and hydrogen sulfide levels. The hydrogen sulfide levels are high enough to be corrosive to piping systems. The water is characterized as "moderately hard" water as it contains 240 parts per million of calcium and magnesium hardness. A desirable level of hardness for a municipal water supply with domestic, industrial and commercial uses is 100 to 130 parts per million.

Frontenac's well water is safe to drink with treatment for hydrogen sulfide removal and disinfection. Beyond the basic requirements of public health and safety, the problem of water quality becomes one of economics as far as providing softening and the wishes of the consumers. The current water treatment plant removes hydrogen sulfide and provides filtration and disinfection.

2. Water Treatment

Improvements and replacement of failing water treatment plant equipment, filter media, controls and plant items that need upgraded are required to provide safe water treatment. [redacted]. Hydrogen sulfide (H_2S) odor control unit is needed to remove the H_2S gas from the aerators exhaust discharge air stream. The H_2S gas smell is very obnoxious and unpleasant. The City continues to receive complaints about this odor. A new waste stream will be generated by the H_2S control unit and it is proposed to send the new waste stream to the filter backwash waste sump for disposal along with the existing process wastewater streams. The proposed method of disposal was in principle accepted by KDHE based on the agreed upon consensus outcome of the formally completed waste stream summary review and disposal method consensus process.

3. Water Distribution System

The water distribution system provides adequate flows for recommended fire protection and safe delivery of water to users. No improvements to the water system are needed at this time.

4. Water Storage

The existing 75,000 gallon elevated water storage tank was constructed in 1907. An April 2006 inspection of this tank indicated that interior and exterior painting is needed and extensive tank repairs are required, especially to the roof. Also, modifications are required to bring the tank into compliance with current paint and safety standards. The tank needs to be replaced to provide for safe and sanitary water storage.

B. AGING INFRASTRUCTURE

[redacted]

2. Water Plant

The water treatment plant has been in operation for over 24 years. Items needing to be replaced due to age and needed for upgrade are shown in Section II, Pages II-14 of this report. Improvements and replacement of certain items in the water treatment plant are needed to provide safe water treatment to meet EPA and KDHE water quality standards. With improvements the water plant would be suitable for use through the design year of 2035, based on present State and Federal regulations.

3. Water Storage

The 75,000 gallon elevated water storage tank at the treatment plant site is over 108 years old and needs replaced. Due to aging, the storage tank and supporting structure are in very poor condition; need major repairs and removal of lead base paint. It is not economically feasible to repair this tank due to age of the tank and cost for repairs.

The tank is considered unsafe and not suitable for continued use through the design period.

C. REASONABLE GROWTH

There has been a steady growth in population served and water demands for water in the planning area served by Frontenac's water facilities.

1. Future Demands for Water

In order to establish reasonable design criteria for the various components of the water distribution system, storage, supply and treatment plant, it is necessary to establish present and estimate the future demands for water. "Demands for Water" is defined as the sum total of the requirements of all the consumers served by the water utility, which includes residential, business and also all leakages, municipal uses and firefighting requirements. It is the obligation of the water utility to supply this demand at all times without restraint or restriction.

There are various types of demands for water used in sizing the water supply, storage and treatment plant, each having a separate meaning in waterworks nomenclature. The various types of demand are listed as follows:

- *Average daily demand* is a mathematical relation inasmuch as there is no such thing as an average day. The value is measured only of the normal requirements imposed on the water supply and treatment plant.

- *Maximum day demand* is also a mathematical conception but it comes nearer to being a measure of the capacity of the water source and water treatment plant necessary to supply water and in the case of some parts of the plant, it may be the exact measure.

- *Instantaneous water use* is an estimate of the maximum amount of water being used within the water system at any one instance in time. The water distribution system must be capable of meeting the maximum demand placed on it to prevent low pressures within the system and also to provide adequate service to all water users. The peak instantaneous use is the ultimate and final measure of the size of waterworks required to supply water, for it is axiomatic that the system must supply demands of the consumer at all times.

- *Fire demand* is an estimate of the amount of water that may be required to fight a major fire within the City. The Insurance Services Office has set forth certain standards for estimating the fire demand in cities, based upon their population, building construction, etc. Fire demand must be added to other users.

There are so many factors affecting water demands that an exact projection of future water use is impossible. Some of the factors affecting water use are changes in population, quality and quantity of water available, weather conditions, cost of water, economic and agricultural conditions and water conservation measures. However, using population and past water use data, a reasonable projection of future water use can be made for facilities design and operational costs.

Should the City experience a large industrial growth or a larger increase in population than projected, it may be necessary to expand the municipal water system beyond those improvements planned herein. The initial construction and proposed improvements as outlined in later parts of this report include a reasonable capacity that will provide time for expansion of the plant if greater demands than anticipated now are encountered in the future.

Water use during the last 5 years in Frontenac, based on water sold, has ranged between 74 and 85 gallons per capita per day (gpcd); whereas per capita water treated has ranged from 93 to 103 gallons per capita per day.

The maximum water production month during the last five year period was 13,670,000 gallons in August 2012. This calculates to be an average of 440,970 gallons per day and the peak is likely to be 1.9 times the average day for the maximum month, or 837,840 gallons for the maximum day.

Based on water production during the last five year period, 331,340 gallons per day is the average water production per day. Free water is water used at ball diamonds, water plant and flushing fire hydrants.

It is recommended the City plans on supplying an average of 90 gpcd for water sold and 125 gpcd for water treated through design year 2035. The water treated amount is based on the City keeping water loss below 15%, which has been achieved for the last 5 years.

This increase in meters will allow for future growth, while still remaining a conservative estimate. The existing number of water meters served by Frontenac, and the projected number to be served in the design year of 2035 are shown in Table III-1. While the City's projected population is expected to increase 13% over the design period, this study will assume a 10% increase in the number of meters served by year 2035.

Table III-1

Water Meters, Present and Design

Year	*Residential*	*Commercial**	*Pasture*	*City***	*Total*
2015	1,433	93	19	16	1,561
2035	1,576	102	21	18	1,717

*Includes 2 high water users
**City meters receive free water and includes 4 meters at cemeteries

The projected new water use for Frontenac for 2035 is 177.0 million gallons per year. The City has current water rights from all three wells together for up to 188.5 million gallons per year. Also, the water right allows diversion from the wells at a rate not to exceed 711 gallons per minute.

The maximum day demand will occur during periods of drought and hot weather conditions. The periods of heavy demands for water can be expected to last a few days to several weeks. The water supply source and water treatment plant must be adequate to supply the anticipated maximum day demands.

Based on past water use data and for cities the size of Frontenac, data and experience has shown that the maximum day usage ranges between 180 to 200 percent of the average day demand during maximum use month. Therefore, the maximum day demand for water for Frontenac has been estimated to be 190% of the average day demand, or 942,200 gallons in design year 2035.

The maximum hourly, instantaneous and fire flows will be provided by the City's water storage tank, water distribution system and water from the treatment facilities.

By replacing and/or upgrading existing aging water supply, treatment facilities and water storage, the water utility will be sustainable to meet the planning area needs through the design year 2035.

* * * * * *

SECTION IV

WATER SYSTEM IMPROVEMENTS

ALTERNATIVES CONSIDERED

A. DESCRIPTION

1. Water Supply and Treatment

a. Sharing Services

Frontenac has had talks with the City of Pittsburg about sharing water services. However, each City has their own suitable and adequate supply and it was not practical for either City to provide water for both cities or abandon their present water service. The City of Frontenac provides water to RWD No. 1, Crawford County through an emergency connection. When necessary, the water district is able to obtain water from the City.

In the past, Frontenac contracted to supply water and maintain the water system in the Capaldo area. The City has now annexed Capaldo and the Capaldo water system is part of the Frontenac water system.

Franklin area and City of Arma, both located north of Frontenac, have a combined water supply with RWD No. 1. Due to the size of Frontenac, it is not practical for these systems to combine services or management.

Based on size, location and existing facilities, facilities that are adequate and suitable for each user, it is not technically feasible or cost effective to require full analysis of possible sharing of water supplies.

[redacted]

[redacted]

c. Water Treatment Plant

The only water treatment alternative considered feasible and cost effective is to continue to use the City's present water treatment plant with improvements recommended herein and the addition of odor control. Constructing a new plant or changing treatment process would be excessively costly and unnecessary.

Upgrading the City's existing water treatment consists of improving the existing plant by replacing worn and outdated equipment. Also, H_2S odor control is included with the plant upgrade.

The following plant improvements list shows the principal components of the plant upgrade. The schematic layout for improvements is shown on page 7 of this section.

[redacted]

The alternative of adding lime softening or ion exchange softening to the water

treatment process was considered. However, due to the project cost for either of these softening methods and the water is only 240 mg/l of total hardness, softening is not recommended. KDHE does not recommend softening if water is less that 300 mg/l of hardness $CaCO_3$. Ion exchange softening would increase sodium levels in the treated water. [redacted]

2. Water Distribution System Improvements

At the present time, no improvements to water distribution are needed to provide adequate water service to all water users.

3. Water Storage

Additional treated water storage is needed for maintaining adequate water service, fire protection flows and water supply during plant shut down for maintenance or caused by power outage. Alternatives for water storage is outlined below:

a. Pumped Ground Water Storage Tank

1) Provide 250,000 gallon in ground concrete water storage tank.
2) Provide high service pumps and generator for pump operation during power outages.
3) Piping, valves, controls and electrical.
4) The initial cost for the groundwater storage tank, pumps, piping, controls and structure to house pumps would be high. Also, operation and maintenance for in ground pumped storage would be higher than elevated water storage tanks, due to the cost of operation for electrical service and maintenance. Therefore, because of the cost and limited use, this alternate has been eliminated.

b. Composite and Fluted Column Elevated Water Storage Tanks

1) Both of these types of water storage tanks are generally used for larger volumes, 500,000 gallons or more. Therefore, no further analysis of these types of water storage tanks will be considered.

c. Pedesphere Elevated Water Storage Tank

1) The Pedesphere is often referred to as a single pedestal tank. Standard capacities for this type of tank range from 50,000 to 1,500,000 gallons.
2) Tank and pedestal are constructed of steel and tank foundation is reinforced concrete.

d. Multi-Column Elevated Water Storage Tank

1) The multi-column elevated water storage tank is often referred to as a legged tank. These tanks standard capacities range in size from 25,000 to 2,000,000 gallons.
2) Tank and supporting legs are constructed of steel and tank foundation is reinforced concrete.

Both the pedesphere and multi-column elevated water storage tanks are viable options. Life cycle cost analysis, along with other factors, must be preformed in order to determine which option is most feasible. Section V of this report reviews the life cycle cost analysis between these two alternatives.

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B. DESIGN CRITERIA

The design criteria for the Frontenac water utility is shown in the following table:

Design Criteria

Design Year	2035
Population 2014	3,437 persons
Design Population	3,880 persons
Existing Services	1,561 meters
Design Services	1,717 meters
Water Treated	
Average Day	485,000 gallons
Maximum Day	942,200 gallons
Water Sold	
Average Day	349,200 gallons
Water Supply	
[redacted]	[redacted]
Treatment Plant Rate	700 gpm
Fire Flow	
Residential Area	500 gpm
School Area	750 gpm
Commercial Area	1,000 gpm
Fire Flow, 2 hrs.	120,000 gallons
Water Storage	
2-Day Average Use Plus Fire Flow	818,400 gallons

Existing water supply and water treatment plant operating at a rate of 700 gpm, will meet maximum day demand in 22.5 hours of operation in design year 2035.

The projected water use for Frontenac for 2035 is 177.0 million gallons per year. [redacted] Also, water right allows diversion from the wells at a rate not to exceed 711 gallons per minute.

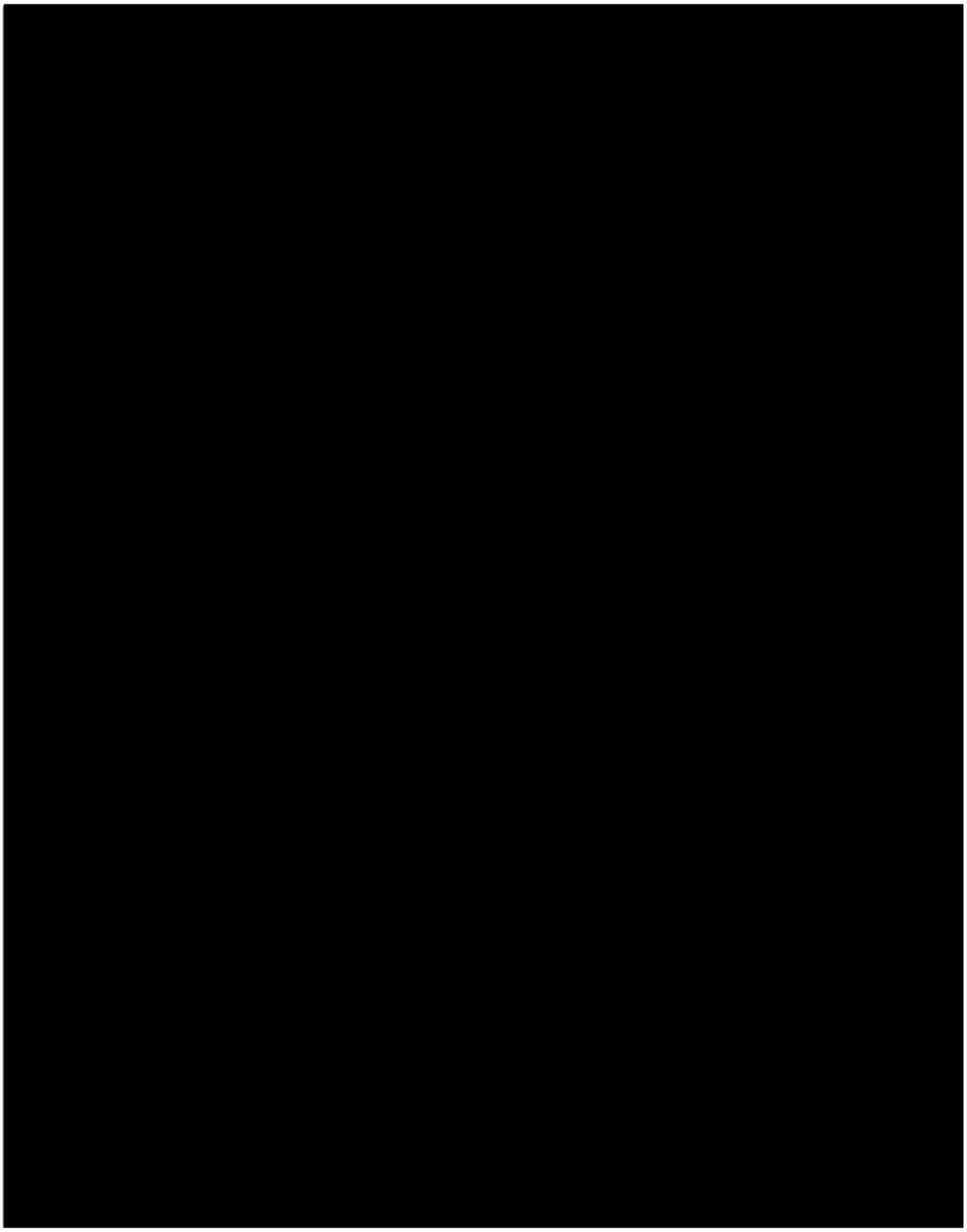
The maximum hourly, instantaneous and fire flows will be provided by the City's water storage tanks, water distribution system and water from the treatment facilities.

(*THE REMAINDER OF THIS PAGE INTENTIONALLY BLANK*)

[redacted]

[redacted]

[redacted]



Revised June 6, 2016

D. ENVIRONMENTAL IMPACTS

All alternatives will have a minimal impact on the environment, except to improve the environment by providing better quality water and Water Treatment Alternate No. 4 to control odors of hydrogen sulfide gas will improve air quality. Hydrogen sulfide gas removed from the well water supply at the treatment has a smell similar to rotten eggs.

The water treatment and water storage tank sites are not in a floodplain or wetland area. Plant facilities and water towers are compatible with the surrounding areas.

There are no important land resources, endangered species, historical or archaeological properties in the treatment plant or water storage tanks sites.

Waste stream flows from the water treatment plant and all waste streams from alternates considered to improve the plant will be discharged to the Frontenac wastewater systems. The existing plant waste streams discharges to the wastewater systems and have not caused any waste treatment problems.

A new waste stream will be generated by the H_2S control unit and it is proposed to send the new waste stream to the filter backwash waste sump for disposal along with the existing process wastewater streams. The proposed method of disposal was in principle accepted by KDHE based on the agreed upon consensus outcome of the formally completed waste stream summary review and disposal method consensus process.

E. LAND REQUIREMENTS

The existing water plant site is of sufficient size to allow for construction of any of the proposed water treatment plant alternates. No land will need to be acquired for water plant improvements.

No additional land will be needed at the existing elevated water storage tank in the Industrial Park for installation of tank controls.

The alternate for a new additional elevated water storage tank will be constructed on existing land owned by the City. The site is a large, unused area between a parking lot and ball diamond.

F. POTENTIAL CONSTRUCTION PROBLEMS

The only problem with construction of the water improvements is to be certain that the plant improvements do not disrupt water treatment process long enough to interrupt water service. This may require some temporary piping and proper scheduling of plant work. This type of construction problem is not a major problem, but usually encountered in plant expansions.

[redacted].

G. SUSTAINABILITY CONSIDERATIONS

[redacted]

All water plant improvements will require minimal additional energy requirements. By use of VFD's on high service pumps, energy consumption can be reduced by lower pumping rates when possible. [redacted]

Some additional energy will be required with for order control system to pump low pressure air. This amount of energy is minimal or negligible when determining annual operation and maintenance costs.

Water reuse is not considered feasible due to cost of equipment and energy cost.

All alternatives have redundant equipment and a standby generator is provided in case of power outages.

The proposed water treatment alternatives are all considered to be sustainable through the design period with routine maintenance and equipment replacement if necessary.

[redacted]

(THE REMAINDER OF THIS PAGE INTENTIONALLY BLANK)

[redacted]

* * * * * *

SECTION V

SELECTION OF ALTERNATIVES

A. LIFE CYCLE COST ANALYSIS

There is no feasible or economical alternative to constructing a new Well No. 4 or upgrading and adding odor control to the existing water treatment plant.

[redacted]

[redacted]

Life Cycle Cost Analysis for Water Storage

City of Frontenac, Kansas

September, 2015

[redacted]

[redacted]

Revised June 6, 2016

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

* * * * * *

SECTION VI

PROPOSED PROJECT

RECOMMENDED IMPROVEMENTS

A. PRELIMINARY DESIGN

[redacted]

Revised June 6, 2016

2. Water Treatment

Upgrading the water treatment plant and adding hydrogen sulfide gas removal is the recommended improvements for water treatment.

The present treatment plant is designed to operate up to 1,050 gpm and is presently being operated at 700 gpm. The treatment process and treatment units are described in Section II.

Principal items recommended for upgrading water treatment plant and odor removal are listed as follows:

3. Water Distribution System

No improvements to the water distribution system are needed or recommended at this time.

4. Water Storage

A 250,000 gallon pedesphere elevated water storage tank is the recommended alternative to provide the additional water storage needed to supply a two-day average water use.

The new water storage tank is to be constructed on land Frontenac owns, northeast of the water treatment plant in the area between a ball diamond and adjacent to the

northwest corner of a parking lot. The tank will have a reinforced concrete foundation, single steel pedestal and 250,000 gallon tank with 100 foot height to the low water line.

Waste Stream Summary

A formal Waste Stream Summary Review and Disposal Method Process has been successfully completed. The complete submittal for review is located in Appendix E herein. The following is the consensus of the summary review by KDHE:

"An accepted consensus outcome pertaining to the environmentally responsible disposal of this project's waste streams has been reached.

Disposing of the H_2S scrubber blow down by way of the city's sanitary sewer collection/treatment system has in concept been found to be acceptable. The scrubber blow down will be combined with the existing process wastewater at the existing filter backwash water process wastewater sump.

[redacted]

The city's water treatment plant has both process and domestic wastewater streams and they are separately discharged to the city's sanitary sewer system. A new process wastewater stream will be generated by the new H_2S scrubber unit. The scrubber blowdown will be combined with the existing general process wastewater stream and also sent to the city's sanitary sewer collection/treatment system. [redacted]

Please note that any changes in the project, e.g., treatment, waste streams, storage, distribution and pumping, siting/land acquisition, for example, will necessitate revisiting the formal waste stream summary review and disposal method consensus process with a submittal revised accordingly.

Please be sure to incorporate the waste stream handling method reviewed in this process in all project related documents from here forward.

While it is recognized that the city's sanitary sewer treatment system is permitted to discharge under a current NPDES permit, the permit will be subject to review and revision should the

additional wastewater load to the facility become problematic for the city. Should that be the case, the formal submission of a revised NPDES wastewater permit application for review would be required. Additionally, the submission of an anti-degradation study for review may also be required prior to the issuance of a revised National Pollutant Discharge Elimination System (NPDES) Permit by KDHE.

Lastly, we respectfully clarify that this correspondence does not in any manner convey immediate KDHE approval to initiate disposal of waste generated by this project. It is strongly recommended that all permits relevant to this project be properly secured prior to letting bids for construction or actually starting construction, but without exception before initiating the disposal of any waste generated by this project. The responsibility for securing all relevant permits rests solely with the public water supply system and their consultant."

B. PROJECT SCHEDULE

The preliminary project schedule is based on Frontenac receiving Rural Development Funding by April 1, 2016.

Item	Date
Completing Project Planning	by 09/15/2016
Bid Opening	by 11/15/2016
Notice of Award	by 12/15/2016
Start Construction	by 01/15/2017
Completion of Construction	by 09/01/2017

[redacted]

[redacted]

D. SUSTAINABILITY CONSIDERATIONS

[redacted]

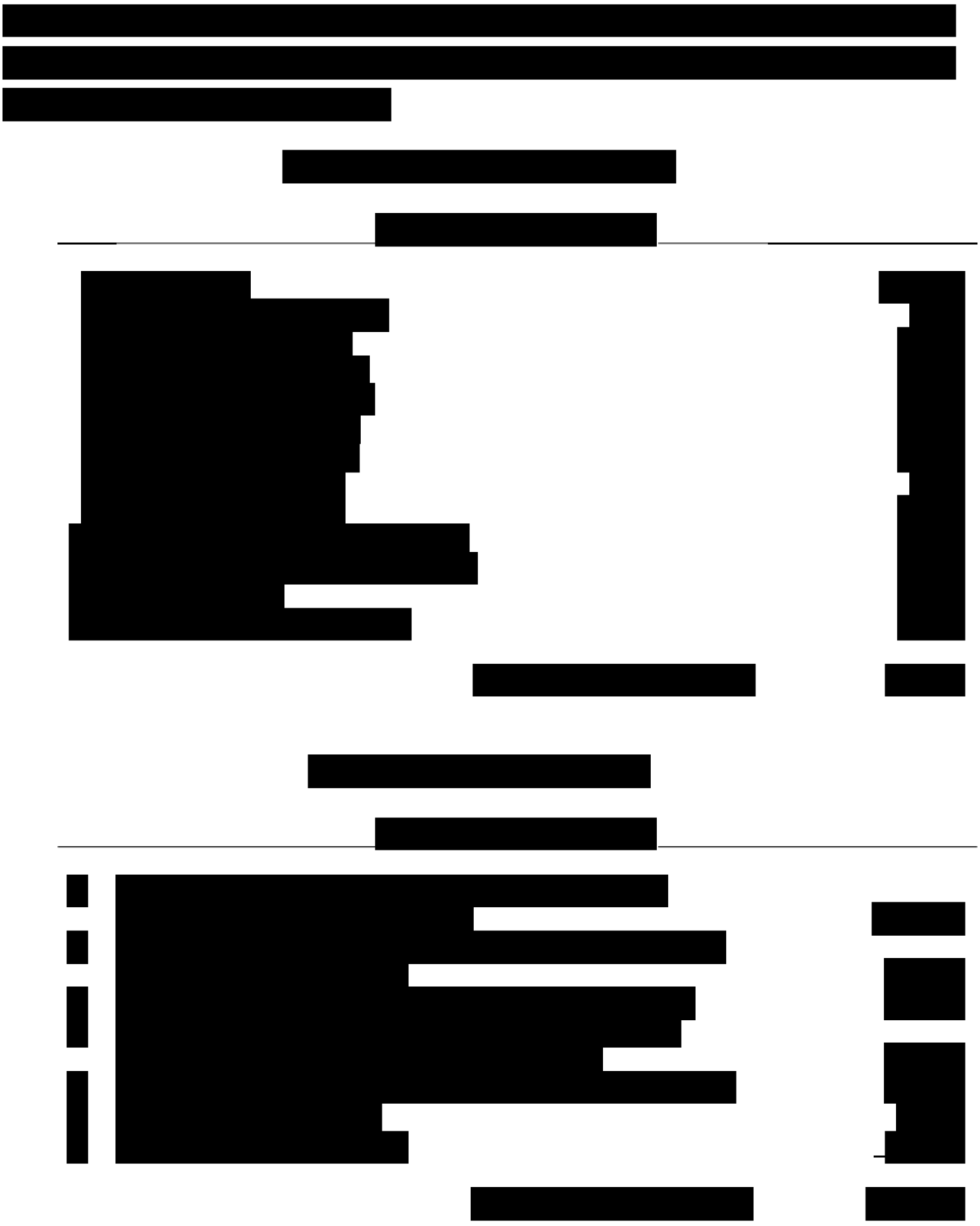
The upgraded water treatment plant with odor control will have the facilities and equipment to treat the Frontenac water supply up to a design rate of 1,050 gpm. With one filter out of service, the plant will still be able to treat water to meet needs of the system. There are three high service pumps and any two of the pumps are capable of meeting peak water needs.

The new elevated water storage tank will greatly improve the ability of the water utility even when wells or treatment plant are out of service. Additional water storage will cut down on the number of cycles for the well pumps and treatment plant operation.

All of the proposed project improvements will greatly improve the sustainability of the water utility facilities.

[redacted]

[redacted]



[redacted]

F. <u>ANNUAL OPERATING BUDGET</u>

1. Income

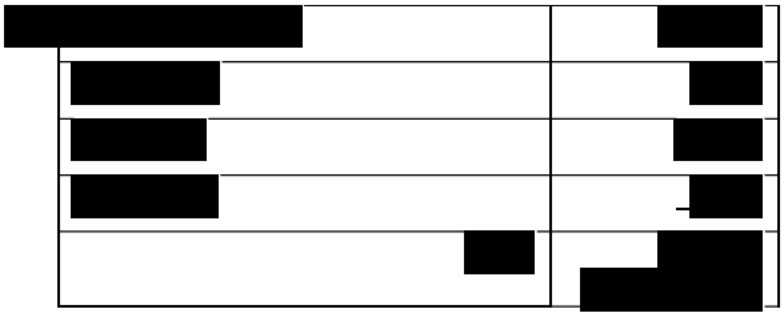
[redacted]

The Water Revenue Summary from the 2016 budget shows a breakdown of revenue sources as shown on Table VI-1 on the following page.

[redacted]

2. Annual O & M Cost

The estimated annual operating cost for the Frontenac Water Utility after the new well, water treatment plant improvements and new water storage tank projects recommended herein will be basically the same cost as before the projects except for operation of the odor control unit and the 20 year short lived asset reserve. Projected O & M cost are estimated as follows:

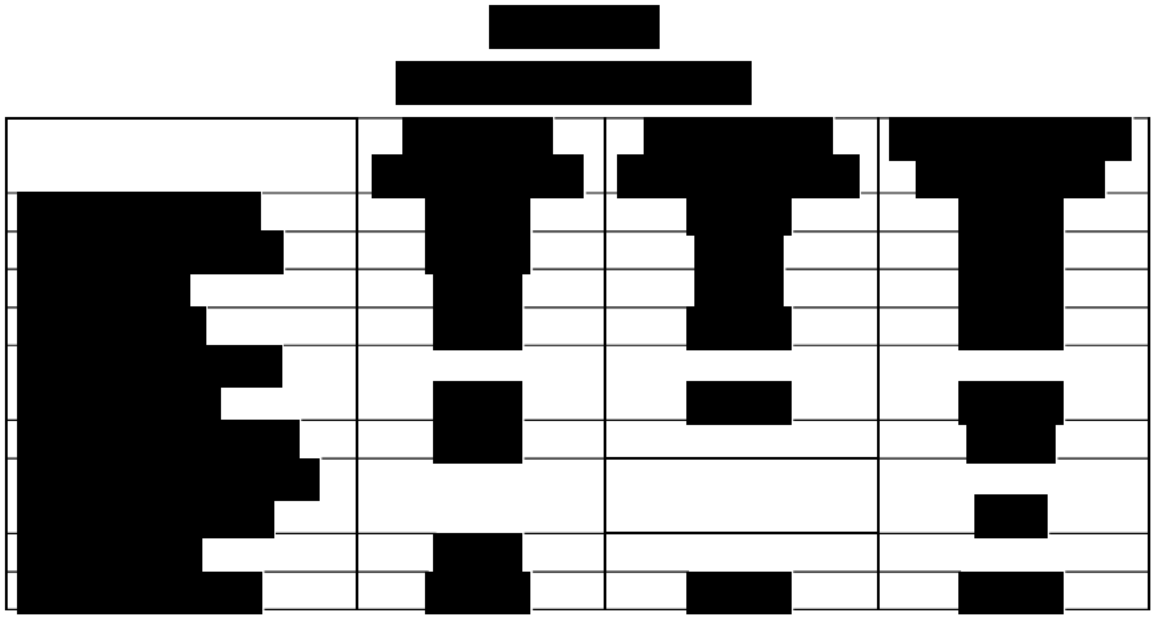


(Odor Control Short Lived Assets are included in 20-year asset reserve.)

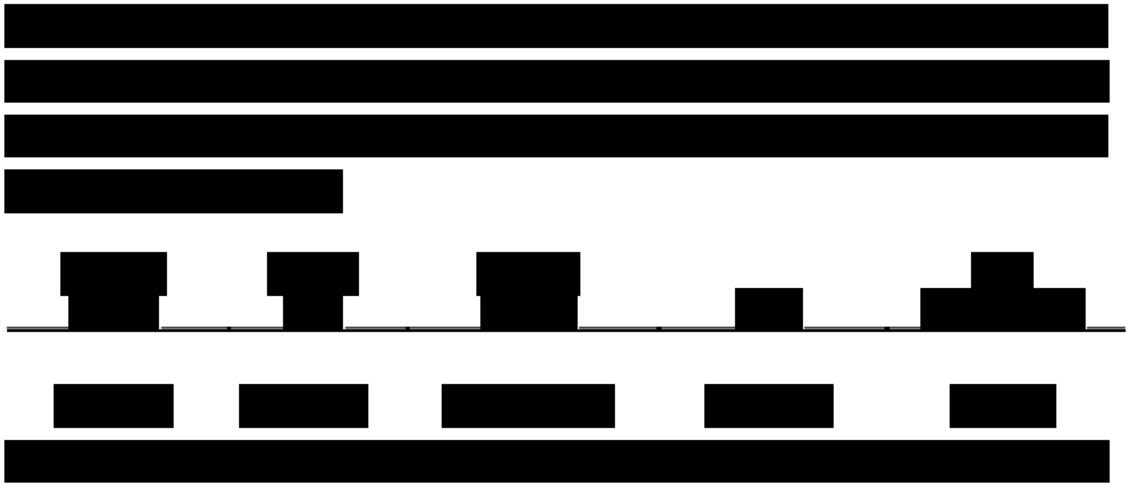
During final design, existing wells and new well will be tested for H_2S gas and odor control designed in accordance with the test results.

The water expenditures in the Frontenac budget for 2016 is projected to be $687,678.

The Water Expenditures Summary from the 2016 budget shows a detailed breakdown of expenditures in Table VI-2.



3. *Debt Payment*



users.

4. *Reserve*

Using RD funding with General Obligation bonds as loan security, no debt service reserve will be required.

However, if GO Bonds are not used, the amount of loan security required will have to be determined when the final financing plan is in place.

Any necessary bond reserve account amount could be added to the loan amount or paid from the City's water utility fund.

Normal day to day small repairs and equipment replacement cost are included in Operation and Maintenance and not included in short lived asset reserve.

The short lived asset reserve account will be funded yearly from water utility revenues over expenses.

* * * * * *

SECTION VII

CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Frontenac water treatment plant is over 24 years old and in order to provide reliable service, several items of equipment need replaced and/or upgraded. Some of these items, such as the filter water distributor, are near structural failure which would cause a plant shut-down. Improvements and upgrades to the treatment plant are needed in order to keep the plant operating and meet water quality standards.

The City's well water is high in hydrogen sulfide (H_2S) and the treatment facilities removed the H_2S and discharge it into the air as a gas. The H_2S gas is very odorous and the City receives several complaints about the gas, especially when it is blown north to the ball diamond and park area.

[redacted]

The water distribution for Frontenac has had several improvements and is in good condition and not in need of any major improvement project at this time.

Water storage is provided by a 160,000 gallon clearwell at the treatment plant, a 250,000 gallon and 75,000 gallon elevated water storage tanks on the distribution system. The 75,000 gallon elevated water storage tank needs to be replaced; it is over 98 years old, in poor condition and failing. An additional 250,000 gallon elevated water storage tank is needed to provide 2 days water use in case of water plant or power failure.

B. RECOMMENDATIONS

It is recommended that Frontenac improve their present water utility as covered in this report. There are no feasible alternatives for the City to provide water service. Based on this study and project information, the recommended water utility improvements and project funding are as follows:

1. Water Supply

1) Construct new Well No. 4
2) Abandon Well No. 2

2. [redacted]

[redacted]

3. Water Storage

1) Construct 250,000 gallon pedesphere water storage tank.
2) Abandon 75,000 gallon elevated water storage tank.

C. FUNDING

The City should continue to work towards obtaining a RD loan and grant to fund the water utility project cost. [redacted] General Obligation bonds should be used for interim funding.

Using present number of water users, 1561 meters, based on RD funding and no grant, the average debt payment per user for the RD loan would be $8.26 per month.

The City should meet with the City Administrator, Attorney, Financial Adviser, Rural Development Specialist and Engineer to develop a final plan to finance the needed water utility improvements.

* * * * * *

APPENDIX A

KDHE SIGNIFICANCE OF INORGANIC WATER ANALYSIS FOR HUMAN USAGE

DIVISION OF HEALTH AND ENVIRONMENTAL LABORATORIES
Department of Health and Environment

SIGNIFICANCE OF INORGANIC WATER ANALYSES FOR HUMAN USAGE

REPORTING UNITS: Most analytical results are reported in units of either in milligrams per liter (mg/L) which are equivalent to parts per million or micrograms per liter (ug/L) which are equivalent to parts per billion. The exceptions are pH which is reported in pH Units, Corrosivity which is reported as Langerlier's Index (LI), Turbidity which is reported in nephelometric turbidity units (NTU) and Specific Conductivity which is reported in micromhos per centimeter (umho/cm).

TOTAL HARDNESS: Calcium and magnesium are the principal minerals contributing to total hardness. Hard water has a tendency to develop scale deposits, especially when heated above 140° F. Soft water may be corrosive. A total hardness of 400 mg/L is considered as excessive in Kansas.

SODIUM: Because high sodium levels can adversely affect those persons on a restricted sodium diet, people need to be aware of the sodium level in their drinking water, especially if the sodium value is greater than 100 mg/L. Water softeners which are recharged with salt (sodium chloride) further increase the sodium level.

POTASSIUM: The concentration of potassium normally found in drinking water has no physiological or aesthetic effects on drinking water users.

ALKALINITY, pH AND LANGERLIER'S INDEX: The alkalinity of water is a measure of its capacity to neutralize acids. Bicarbonate and carbonate are the major contributors to alkalinity. The pH value of a solution indicates the intensity of the acidic or basic character of the solution. The pH scale extends from 0, very acidic, to 14, very alkaline, with 7 being neutral. The relationship of pH, calcium and alkalinity determines whether a water is corrosive or whether it will deposit calcium carbonate. Langerlier's Index (LI) is an indicator of the corrosivity of water. KDHE interprets a water as being highly aggressive if the LI is less than -2.0, moderately aggressive if between -2.0 and 0, and nonaggressive if greater than 0.

CHLORIDE: The suggested limit for chloride is 250 mg/L because some people can detect a salty taste when chloride exceeds 250 mg/L. Chloride has no physiological effect.

SULFATE: The suggested limit for sulfate is 250 mg/L because of the bitter taste and laxative effects of sulfate above that level. Sulfate can act as a laxative to sensitive persons not accustomed to high sulfate water.

NITRATE: The drinking water standard for nitrate, reported as nitrogen (N), is 10 mg/L. Excessive nitrate may result in infant cyanosis, also known as methemoglobinemia or "blue baby syndrome", in children less than one year of age. There are no significant health effects for older children or adults. Boiling water will not remove nitrate.

FLUORIDE: The maximum contaminant level (MCL) for fluoride is 4.0 mg/L with a suggested limit of 2.0 mg/L. A fluoride concentration of approximately 1.0 mg/L helps prevent dental caries. At concentrations below 0.7 mg/L, fluoride will not be of any benefit. At concentrations above 2.0 mg/L, fluoride may cause mottling of the teeth.

TURBIDITY: Turbidity in water is the suspended material which causes a beam of light to scatter. Turbidity can be significant aesthetically and physiologically because it can provide a support for bacteria. The limits for surface water is a maximum two-day average of 5 NTU and a maximum average of 1 NTU over a thirty-day period. No limits are established for ground water.

SPECIFIC CONDUCTANCE: Conductance is a numerical expression of the ability of water to conduct an electric current. Because the number which is expressed as micromhos per centimeter, depends on the concentration of the dissolved minerals, conductance indicates the degree of mineralization in water. A conductance greater than 1,500 µmho/cm is considered excessive.

TOTAL DISSOLVED SOLIDS: TDS is a measure of the dissolved material in water. EPA suggests a TDS over 500 mg/L is objectionable because of the mineral taste and the possible physiological effects.

TOTAL PHOSPHORUS: Phosphate is a nutrient found in water. In raw surface water, phosphate may cause water treatment problems associated with aquatic plants and with coagulation. Phosphate is used occasionally in a effort to keep iron and manganese in solution.

SILICA: Silica has no physiological significance to humans, but can cause crusting deposits on well screens, pipes and water heaters. Concentrations above 50 mg/L may cause a cloudy appearance.

AMMONIA: Ammonia can occur naturally in water supplies, while some water treatment plants add ammonia to react with chlorine to form a combined chlorine residual to control formation of trihalomethanes. At concentrations normally found it has no health effect, but may cause unpleasant odors.

IRON AND MANGANESE: Iron and manganese are objectionable because of the bad taste associated with the water, the staining of plumbing fixtures and laundered clothes, and the probable deposition of the elements in the distribution system. They have no significance physiologically. The suggested limits for iron and manganese are 0.3 mg/L and 0.05 mg/L respectively.

HEAVY METALS: For physiological effects the present standards for heavy metals and cyanide are:

Arsenic	50.0 ug/L	Barium	2000.0 ug/L	Cadmium	5.0 ug/L	Nickel	100.0 ug/L
Chromium	100.0 ug/L	Lead	15.0 ug/L	Mercury	2.0 ug/L	Thallium	2.0 ug/L
Selenium	50.0 ug/L	Antimony	6.0 ug/L	Beryllium	4.0 ug/L	Cyanide	200.0 ug/L

The suggested limits for copper and zinc are 1.3 mg/L and 5.0 mg/L respectively. The presence of copper and zinc indicates a possible corrosion problem.

Should there be further questions, the telephone number of the KDHE Bureau that deals with water and the Laboratory are:

Bureau of Water	(785) 296-5518
Environmental Chemistry Laboratory, Inorganic Section	(785) 296-1657

APPENDIX B

KDHE WELL TEST RESULTS

CR Co HD

360

JTH/11-V

DIVISION OF HEALTH & ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Building #740, Topeka, Kansas 66620-0001
(785) 296-1620

REPORT OF ANALYSIS

INORGANIC CHEMISTRY

Report To: Gary Cignetti, Water Supt.
313 E. McKay, P.O. Box 1012

Frontenac KS 66763-1012

Lab Number: 430386WS
I5500 City of Frontenac

Site ID: 00133115
Account Code: PE

Collection Location: 207 N. Labette

Collector: Gary Cignetti
Date/Time Collected: 02/24/04 09:00

Matrix: Water

Collect Depth:
Date/Time Received: 02/25/04 09:12

Sample Comments:

Parameter	*Analytical Result*		*Units*	*Analysis Date*	*Analytical Method*
Alkalinity as CaCO3	210		mg/L	02/25/04	SM 2320B
Aluminum	< 10		ug/L	03/01/04	EPA 200.8
Antimony	< 1.0		ug/L	03/01/04	EPA 200.8
Arsenic	< 1.0		ug/L	03/01/04	EPA 200.8
Barium	190		ug/L	03/01/04	EPA 200.8
Beryllium	< 1.0		ug/L	03/01/04	EPA 200.8
Cadmium	< 1.0		ug/L	03/01/04	EPA 200.8
Calcium	54		mg/L	02/26/04	EPA 200.7
Chloride	170		mg/L	02/25/04	EPA 300.0
Chromium	< 1.0		ug/L	03/01/04	EPA 200.8
Copper	5.7		ug/L	03/01/04	EPA 200.8
Corrosivity	0.23		LI	03/09/04	Langlier Idx
Fluoride	0.49		mg/L	02/25/04	EPA 300.0
Iron	0.012		mg/L	02/26/04	EPA 200.7
Lead	< 1.0		ug/L	03/01/04	EPA 200.8
Magnesium	24		mg/L	02/26/04	EPA 200.7
Manganese	1.4		ug/L	03/01/04	EPA 200.8
Mercury	< 0.50		ug/L	03/04/04	EPA 245.1
Nickel	1.6		ug/L	03/01/04	EPA 200.8
Nitrate (N)	< 0.10		mg/L	02/25/04	EPA 300.0
Potassium	5.3		mg/L	02/26/04	EPA 200.7
Selenium	1.6		ug/L	03/01/04	EPA 200.8
Silica	11		mg/L	02/26/04	EPA 200.7
Silver	< 1.0		ug/L	03/01/04	EPA 200.8
Sodium	110		mg/L	02/26/04	EPA 200.7
Specific Conductivity	930		umho/cm	02/25/04	SM 2510B
Sulfate	36		mg/L	02/25/04	EPA 300.0
Thallium	< 1.0		ug/L	03/01/04	EPA 200.8
Total Dissolved Solids	530		mg/L	03/09/04	USGS I751-8
Total Hardness	230		mg/L	03/09/04	SM 2340B
Total Phosphorus (P)	< 0.020		mg/L	03/08/04	EPA 365.1
Turbidity	< 0.15	*	NTU	02/26/04	SM 2130B
Zinc	0.0085		mg/L	02/26/04	EPA 200.7
pH	7.8		pH unit	02/25/04	EPA 150.1

Analytical Comments:

Reporting Analyst: JAB
Date Reported: 03/09/04

< - Not Detected at Indicated Level
* - Holding Time Exceeded

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BOW-PWSS

DIVISION OF HEALTH & ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Building #740, Topeka, Kansas 66620-0001
(785) 296-1620

RHC 11

REPORT OF ANALYSIS

ORGANIC CHEMISTRY

Report To: DAN BRUNETTI
Address: PO BOX 1012, 313 E MCKAY
FRONTENAC, KS 66763-1012

Lab Number: 460039DF
Date Rec'd: 09/14/05
Report Date: 09/26/05

Site ID No.: DS1
Acct No: I5500 City of Frontenac
Sample Type: WATER
Program Code: PD
Site: 209 SUGAR CREEK RD
No. Composited:
Collected By: GARY CIGNETTI
Depth:
Date: 09/13/05
Time: 08:45

HALOACETIC ACIDS	*CONCENTRATION (ug/L)*	*Analysis Date*	*EPA No.*
Monochloroacetic Acid	< 2.0	09/23/05	.2
Dichloroacetic Acid	< 0.50	09/23/05	.2
Trichloroacetic Acid	< 0.50	09/23/05	.2
Monobromoacetic Acid	0.54	09/23/05	.2
Dibromoacetic Acid	1.8	09/23/05	.2
Total Haloacetic Acids (HAA5)	< 4.0	09/23/05	.2

Chemist: Jim Cook

< - Not Detected at Indicated Level

PC: RON CRAMER, BOW, CURTIS BUILDING, TOPEKA, KS, 66612
GREG TAYLOR, SEDO, 1500 W. 7TH ST., CHANUTE, KS 66720-9701

DIVISION OF HEALTH & ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Building #740, Topeka, Kansas 66620-0001
(785) 296-1620

REC 11

REPORT OF ANALYSIS

ORGANIC CHEMISTRY

Report To: DAN BRUNETTI
Address: PO BOX 1012, 313 E MCKAY
FRONTENAC, KS 66763-1012

Lab Number: 460039TF
Date Rec'd: 09/14/05
Report Date: 09/25/05

Site ID No.: DS1
Acct No: I5500 City of Frontenac
Sample Type: WATER
Program Code: PD
Site: 209 SUGAR CREEK RD
No. Composited:
Collected By: GARY CIGNETTI
Depth:
Date: 09/13/05
Time: 08:45

TRIHALOMETHANES	*CONCENTRATION (ug/L)*	*Analysis Date*	*EPA No.*
Trichloromethane (THM)	< 0.50	09/20/05	.2
Bromodichloromethane (THM)	0.95	09/20/05	.2
Dibromochloromethane (THM)	2.3	09/20/05	.2
Bromoform (THM)	4.3	09/20/05	.2
Total Trihalomethanes	7.6	09/20/05	.2

Chemist: Richard L. Pierce

< - Not Detected at Indicated Level

PC: RON CRAMER, BOW, CURTIS BUILDING, TOPEKA, KS, 66612
GREG TAYLOR, SEDO, 1500 W. 7TH ST., CHANUTE, KS 66720-9701

DIVISION OF HEALTH & ENVIRONMENTAL LABORATORIES
Kansas Department of Health and Environment
Forbes Building #740,Topeka, Kansas 66620-0001
(785) 296-1620

City

REPORT OF ANALYSIS

RADIOCHEMISTRY

Report To: Kenny Redlon, Water Supt.
315 E. McKay, P.O. Box 1012

Frontenac KS 66763-1012

Lab Number: 100003PD
I5500 City of Frontenac

Site ID:
Account Code: PD

Collection Location: City of Frontenac; 207 N. Labett (2), Police Dept. (2)
Collector: K. Redlon (4)
Date/Time Collected: 07/10/00 08:30
Sample Description: Public Drinking Water
Date/Time Received: 07/11/00 09:00
Sample Comments: Collected 10/6/99,1/11/00,4/11/00; Received 10/7/99,1/12/00,4/12/00

Parameter	*Analytical Result*	*Units*	*Error at 95% level*	*Analysis Date*	*Analytical Method*
Gross-Alpha	7	pCi/L	2	07/17/00	AB-01(EPA 900.0)
Ra-226	3.9	pCi/L	0.2	08/22/00	Ra-01(EPA 903.1)
Ra-228	< 1.2	pCi/L		07/21/00	Ra-01(EPA 904.0)

Analytical Comments: This is a composite result of four samples. This is a composite result four samples

Reporting Analyst: NDL Date Reported: 08/23/00 < - Not Detected at Indicated Level

The only radiological analyses currently required by the U.S. EPA National Primary Drinking Water Regulations are Gross Alpha analysis and, if the Gross Alpha analysis is over 5 pCi/L, Radium analysis. In special cases we may also perform a Uranium analysis.

The maximum contaminant levels, (MCL), are:

Gross Alpha	15 pCi/L
Combined Radium 226 and 228	5 pCi/L

If either of these levels are exceeded public notification is required and corrective actions must be taken by the water system to reduce the levels.

Uranium, while contributing to the Gross Alpha reading, does not have a separate drinking water standard yet. If Uranium is present in a sample, the result is subtracted from the Gross Alpha result before compliance with the standards is determined.

Additional questions concerning compliance with Public Drinking Water Standards may be directed to Jean Herrold, (913) 296-5518.

Copies To: File
BOW - Jean Herrold
Rad. Control - D. Whitfill
SEDO

APPENDIX C

WATER AND SEWER ORDINANCE NO. 2014-07

ORDINANCE NO. 2014-07

AN ORDINANCE OF THE CITY OF FRONTENAC, KANSAS, ESTABLISHING RATES AND MINIMUM CHARGES FOR WATER AND SEWER SUPPLIED TO RESIDENCES AND BUSINESSES AND REPEALING ALL OTHER WATER AND SEWER ORDINANCES.

BE IT ORDAINED BY THE GOVERNING BODY OF THE CITY OF FRONTENAC, KANSAS:

Section One. All prior Ordinances establishing water and sewer rates and charges by the City of Frontenac, Kansas are hereby repealed. Specifically, City of Frontenac Ordinance No. 2013-13 is hereby repealed after January 14, 2015.

Section Two. For purposes of this Ordinance "utility services" shall be for water and sewer service charges and all applicable and authorized additions and penalties with respect thereto.

Section Three. All billing for utility services shall be due and payable at the office of the City Clerk of Frontenac, Kansas on the 20th day of each month and must be paid in full by the 23rd day of that month after which date is shall be considered delinquent. A charge of 10 percent penalty will be added to said bill for utility services on the morning of the 23rd day of the month if said bill is unpaid at the close of business on the 20th day of the month, unless the 20th day of the month falls on a Sunday or Holiday, in which instance the next regular business day shall apply.

Section Four. A delinquency and termination of written notice shall be issued on the 20th day of the month or next business day if the 20th falls on a Sunday or Holiday, with respect to any delinquent and unpaid utility service bill and said delinquency and termination notice shall provide the customer with the following information, to-wit: (1) the amount due including all applicable penalties and additions with respect to the unpaid utility service bill; (2) notice that service will be terminated and disconnected within 5 days. Such notice shall be deemed sufficient if delivered personally to the utility services customer or placed or posted near the door of the residence or posted in mail, and a $5.00 notice charge shall then be added to the bill.

Section Five. Deposits, Reconnection Cost and Fees, Miscellaneous.

Any customer desiring water services, after the date of enactment of this Ordinance, that is not the property owner shall be required to pay a deposit sum of $75.00 to be deposited with the Frontenac City Clerk. In the absolute discretion of the City Council, all or part of such deposit may from time to time be refunded to the customer. All reconnections for a customer to the water system whether disconnection occurred at the customer's request or as a result of having failed to timely pay for water, shall be made only after payment of a meter reconnection fee of $100.00. At the discretion of the Frontenac City Administrator, and or City Clerk, customers who were shut off for non-payment for the first time may be permitted to pay the $100.00 reconnection fee in two equal installments of $50.00 on specified dates set forth by the Frontenac City Administrator, and or City Clerk.

Section Six. Water Rates for Residences and Businesses.

The following rates and minimum charges for water service provided to residences and businesses shall be as follows:

FOR RESIDENCES WITHIN THE CITY LIMITS OF THE CITY OF FRONTENAC, KANSAS

A) For all water consumed not in excess of two thousand (2,000) gallons per month, the minimum charge shall be $12.88

B) For each one hundred (100) gallons per month above the minimum of two thousand (2,000) gallons, the additional charge per hundred (100) gallons shall be $.432

FOR RESIDENCES OUTSIDE THE CITY LIMITS OF THE CITY OF FRONTENAC, KANSAS.

C) For all water consumed not in excess of two thousand (2,000) gallons per month, the minimum shall be $17.59

D) For each one hundred (100) gallons per month above the minimum of two thousand (2,000) gallons, the additional charge per hundred (100) gallons shall be $.547

FOR BUSINESSES

E) For all water consumed not in excess of two thousand (2,000) gallons per month, the minimum shall be $18.03

F) For each one hundred (100) gallons per month above the minimum of two thousand (2,000) gallons, the additional charge per hundred (100) gallons shall be $.483

Section Seven. Water Meter Replacement Fee and Water Meter Deposit.

On and after the effective date of the Ordinance, the following charges shall be assessed for the placement of water meter:

A) For all new meters installed, there shall be a $300.00 service charge, plus materials and labor costs for the installment of said meter.

B) A disconnection charge of $100.00 shall be applied when it becomes necessary due to non-payment or untimely payment.

C) In addition to the above one time meter charges, there shall be a monthly charge of $6.50 per meter with said fees generated to be placed in a utility maintenance fund.

Section Eight. Deposit for Service to Rentals.

On and after the effective date of the Ordinance, a deposit of $75.00 shall be paid by non-owned residential user as security for the payment of water service and sewer charges.

A separate account of the date on which such deposit is received, the name of the depositor and the amount thereof, shall be maintained by the City and the City shall pay to the customer making the deposit, interest at the rate determined by the State Corporation Commission.

Upon termination of an account, all fees and charges will be deducted from the deposit and the remainder, if any, will be refunded to the customer. Any amount due on an account above the amount of the service deposit is considered due and collectible by the City.

Section Nine. Sewer Charge.

On and after the effective date of the Ordinance, the sewer charges shall be:

FOR RESIDENCES AND BUSINESSES

A) Minimum charge for a sewer per month shall be $15.65 for the first two thousand (2,000) gallons of water used.

B) For each one hundred (100) gallons per months, above the minimum of two thousand (2,000) gallons, the additional charge per hundred (100) gallons shall be $.222

For the purpose of this section each resident, multi-family residence, mobile home, apartment, motel/hotel, rooming house, or institution shall be assessed the minimum charge for sewer per month per each unit.

Section Ten. Sewer Tap Fee, Costs, Approval, Miscellaneous Provisions.

The City shall establish a sewer tap fee of One Hundred and Fifty Dollars ($150.00) for a standard main sewer tap. In the event it is necessary to cut or excavate the street and or alleyway then the cost shall be Three Hundred Dollars ($300.00). The City requires that all new and replacement sewer taps be performed by a licensed plumber and the City reserves the right to inspect the same. The City of Frontenac is not responsible for sewer taps, the sewer taps remain the responsibility of the property owner.

Section Eleven. Summer Water Usage.

A customer may request, for the months of July, August and September of each year, an annual average of water consumption for the months of November, December and January preceding in order to obtain a base upon which the user charge may be computed to allow for any increased water usage during the summer months which may not have a corresponding sewer usage. New customer's bill will be estimated until a base is obtained.

Section Twelve. Collection Fees

The City of Frontenac reserves the right to assess against any customer the costs associated with the collection of any unpaid balance, including those charges and fees which may be assessed by a collection agency utilized by the City.

Section Thirteen. Effective Date.

This Ordinance shall take full force and effect on the 15th day of January, 2015, provided it has been published one time in the official city newspaper.

Dated this 1st day of December, 2014.

_____

Mayor James Kennedy

Attest:

_____

City Clerk Douglas E. Sellars

(Seal)

APPENDIX D

CONSUMER CONFIDENCE REPORT

CITY OF FRONTENAC
Consumer Confidence Report – 2015
Covering Calendar Year – 2014

This brochure is a snapshot of the quality of the water that we provided last year. Included are the details about where your water comes from, what it contains, and how it compares to Environmental Protection Agency (EPA) and state standards. We are committed to providing you with information because informed customers are out best allies. It is important that customers be aware of the efforts that are made continually improve their water systems. **To learn more about your drinking water, please attend any of the regularly scheduled City Council meetings which are held at Frontenac City Hall, 315 East McKay on the 1st Monday of each month at 6:00 pm and 3rd Monday of each month at 12:00 noon.**
For more information please contact, **DOUG SELLARS at 620-231-9210.**

Your water comes from 3 Ground Water Wells.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as those with cancer under going chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

The sources of drinking water (both tap water and bottled water) included rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in sources water before we treat it include:
Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, livestock operations and wildlife.
Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
Pesticides and herbicides, which may come from a variety of sources such as storm water run-off, agriculture, and residential users.
Radioactive contaminants, which can be naturally occurring or the result of mining activity.

usually harmless, but their presence in water can be an indication of disease-causing bacteria. When coliform bacteria are found, special follow-up tests are done to determine if harmful bacteria are present in the water supply. If this limit is exceeded, the water supplier must notify the public.

Water Quality Data

The tables following below list all of the drinking water contaminants, which were detected during the 2014 calendar year. The presence of these contaminants does not necessarily indicate the water poses a health risk. Unless noted, the data presented in this table is from the testing done January 1- December 31, 2014. The state requires us to monitor for certain contaminants less than once per year because the concentrations of these contaminants are not expected to vary significantly from year to year. Some of the data, though representative of the water quality, is more than one year old.

The bottom line is that the water that is provided to you is safe.

Terms & Abbreviations

Maximum Contaminant Level Goal (MCLG): the "Goal" is the level of a contaminant in drinking water below which there is no known or expected risk to human health. MCLGs allow for a margin of safety.
Maximum Contaminant Level (MCL): the "Maximum Allowed" MCL is the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Secondary Maximum Contaminant Level (SMCL): recommended level for a contaminant that is not regulated and has no MCL.
Action Level (AL): the concentration of a contaminant that, if exceeded, triggers treatment or other requirements.
Treatment Technique (TT): a required process intended to reduce levels of a contaminant in drinking water.
Maximum Residual Disinfectant Level (MRDL): the highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Non-Detects (ND): lab analysis indicates that the contaminant is not present.
Parts per Million (ppm) or milligrams per liter (mg/l)
Parts per Billion (ppb) or micrograms per liter (µg/l)
Picocuries per Liter (pCi/L): a measure of the radioactivity in water.
Millirems per Year (mrem/yr): measure of radiation absorbed by the body.
Monitoring Period Average (MPA): An average of sample results obtained during a defined time frame, common examples of monitoring periods are monthly, quarterly, and yearly.
Nephelometric Turbidity Unit (NTU): a measure of the clarity of water.

Testing Results for: CITY OF FRONTENAC

Microbiological	Result	MCL	MCLG	Typical Source
Coliform (TCR)	In the month of November, 1 sample returned as positive.	MCL (systems that collect less than 40 samples/ month) : No more than 1 positive monthly sample	0	Naturally present in the environment

Regulated Contaminants	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
ARSENIC	2/11/2013	1.5	1.5	ppb	10	0	Erosion of natural deposits
BARIUM	2/11/2013	0.18	0.18	ppm	2	2	Discharge from metal refineries;
CHROMIUM	2/11/2013	1.3	1.3	ppb	100	100	Discharge from steel and pulp mills
FLUORIDE	2/11/2013	0.54	0.54	ppm	4	4	Natural deposits; Water additive which promotes strong teeth.
SELENIUM	2/11/2013	5	5	ppb	50	50	Erosion of natural deposits
NITRATE	2/11/2013	0.13	0.13	ppm	10	10	Runoff from fertilizer use

Disinfection Byproducts	Monitoring Period	Highest RAA	Range	Unit	MCL	MCLG	Typical Source
Total Haloacetic Acids (HAA5)	2014	8	7.9	ppb	60	0	By-product of drinking water disinfection
Total Trihalomethanes (TTM)	2014	28	28	ppb	80	0	By-product of drinking water chlorination

Lead and Copper	Monitoring Period	90th Percentile	Range	Unit	AL	Sites Over AL	Typical Source
COPPER, FREE	2011-2013	0.034	0.0037-0.035	ppm	1.3	0	Corrosion of household plumbing systems
LEAD	2011-2013	ND	NA	ppb	15	0	Corrosion of household plumbing systems

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Your water system is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Radionuclides	Collection Date	Highest Value	Range	Unit	MCL	MCLG	Typical Source
RADIUM, COMBINED (226, 228)	4/22/2013	5.2	5.2	pCi/l	5	0	Erosion of natural deposits

Secondary Contaminants	Collection Date	Highest Value	Range	Unit	SMCL
ALKALINITY, TOTAL	2/11/2013	205	205	MG/L	300
CALCIUM	2/11/2013	61	61	MG/L	200
CHLORIDE	2/11/2013	200	200	MG/L	250
CONDUCTIVITY @ 25 C UMHOS/CM	2/11/2013	1100	1100	UMHO/CM	1500
CORROSIVITY	2/11/2013	0.5	0.5	LANG	0
HARDNESS, TOTAL (AS CAC03)	2/11/2013	260	260	MG/L	400
IRON	2/11/2013	0.011	0.011	MG/L	0.3
MAGNESIUM	2/11/2013	26	26	MG/L	150
MANGANESE	2/11/2013	0.0017	0.0017	MG/L	0.05
pH	2/11/2013	8	8	pH s.u.	8.5
POTASSIUM	2/11/2013	5.4	5.4	MG/L	100
SILICA	2/11/2013	11	11	MG/L	50
SODIUM	2/11/2013	120	120	MG/L	100
SULFATE	2/11/2013	43	43	MG/L	250
TDS	2/11/2013	590	590	MG/L	500
ZINC	2/11/2013	0.0086	0.0086	MG/L	5

During the 2014 Calendar Year, we had no violations of drinking water regulations.

Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other potentially harmful bacteria may be present. Coliforms were found in one sample in 2014, which does not exceed the limit for systems that collect fewer than 40 samples per month.

Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.

Please Note: Because of sampling schedules, results may be older than 1 year.

APPENDIX E

WASTE STREAM SUBMITTAL DOCUMENTS

KRAMER CONSULTING, LLC

Engineers – Planners – Surveyors

WASTE STREAM DISPOSAL

WATER TREATMENT PLANT

FOR

CITY OF FRONTENAC, KANSAS

Job No. 1422 **May 6, 2016**

WASTE STREAM DISPOSAL

WATER TREATMENT PLANT

OWNER:

CITY OF FRONTENAC, KANSAS

ENGINEERS:

KRAMER CONSULTING, LLC
4336 SE 37th Street
Topeka, KS 66605
785-234-6600

Job No. 1422

May 6, 2016

KRAMER CONSULTING, LLC
ENGINEERS • PLANNERS • SURVEYORS
4336 SE 37TH STREET • TOPEKA, KANSAS 66605 (785) 234-6600 • JACK@KRAMERLLC.NET

May 6, 2016

REPORT

Waste Stream Disposal - Water Treatment Plant

City of Frontenac, Kansas

The City of Frontenac is proposing water treatment plant improvements and upgrades in order to continue to provide reliable, adequate and safe drinking water for the City patrons. The proposed plant improvements and upgrades will not change the existing waste streams. However, the addition of a Hydrogen Sulfide (H_2S) air scrubber will produce an additional waste stream as outlined in this report.

Included as a part of this report is a Process Flow Diagram labeled Figure 1 showing the flow process, along with chemical feeding points, principal chemicals present and characterization for the waste streams generated. Also included is an aerial photo labeled Figure 2 showing the water treatment plant waste stream discharge route through the sanitary sewer collection system to the waste stabilization ponds.

[redacted]

The average water treatment plant run time, based on the design year 2035, is 11.5 hours per day at a plant operating rate of 700 gpm. The water treatment flow, as shown in Figure 1, starts from the existing water supply wells, pumped to the water treatment site through aerators, then injected with 12 lbs./day Cl_2. Once the water goes through the aerators, it flows through the chlorine contact basin which is designed for disinfection and settling out the hydrogen sulfide from the water. The water from the chlorine contact basin flows into the filter building, and through the water treatment filters. Water is then injected with post Cl_2 at 12 lbs./day while entering the clearwell. From the clearwell, treated water is then pumped to the City's water distribution system. With the addition of the H_2S air scrubber, air discharged from the aerators will go through a duct to the air scrubber. The air will be treated with 6 gallons/hour 25% NaOH and 42 gallons/hour 12.5% NaOCl in the air scrubber to help with hydrogen sulfide odor, then the air is released from the scrubber unit into atmosphere. No process water enters the H_2S air scrubber. The water treatment plant flow process can be seen on Figure 1, attached herein.

The City tests treated water for chlorine residuals in the laboratory. This is the only testing completed in the laboratory. There are no on-line analyzers. The drain located in the

laboratory is used when mopping the floor. There are no other floor drains located in the City's Water Treatment Plant.

The plant discharges all process water waste streams to a Filter Backwash Waste Sump. Waste water from the Filter Backwash Waste Sump is then pumped out to a manhole located in the City's existing sanitary sewer collection system, then the waste gravity flows from that manhole to the City's existing First Cow Creek Pump Station and then re-pumped at the First Cow Creek Pump Station to the waste stabilization ponds (lagoons) for treatment.

The domestic waste stream gravity flows from the water treatment plant, north to the existing sanitary sewer along McKay street, and then flows through the gravity sewer collection system disposal path that the process water waste stream flows through.

The process water waste stream and the domestic water waste stream are not connected.

The process water waste stream, along with the domestic waste stream disposal path to the City's waste stabilization pond treatment system can be seen in Figure 2, attached herein.

The water treatment plant process and domestic waste streams are treated at the City's waste stabilization ponds. The ponds have a total surface area of 32.54 acres. The ponds are designed for 6,100 persons at 100 gallons per capita per day. The City currently serves approximately 3,400 persons. No large industries discharge to the City sewers.

The City's waste stabilization pond treatment system operates under a National Pollutant Discharge Elimination System (NPDES) Permit No. M-NE27-OO01, which allows the City to discharge from the waste stabilization ponds to Cow Creek via First Cow Creek, and eventually flows to the Neosho River Basin. The facility location is in the NE ¼, NW ¼, Section 7, Township 30 South, Range 25 East, Crawford County, Kansas.

The existing sanitary sewer collection system, Filter Backwash Waste Sump pumps and the First Cow Creek Pump Station pumps are adequately sized to handle existing waste streams and additional waste stream of 2,070 gallons per day from H_2S scrubber. The additional 2,070 gallons per day requires the First Cow Creek Pump Station to pump an additional 1 minute per day.

The two current water supply wells produce no inorganic or organic concentrations above the maximum contaminant level for drinking water. Table 1 below shows typical chemical well water analysis for Frontenac's wells:

TABLE 1
Well Water Supply Water Quality

Component	Well Water Supply	Units
Total Hardness, as $CaCO_3$	240	mg/L
Calcium, as Ca	55	mg/L
Magnesium, as Mg	25	mg/L
Sodium	100	mg/L
Total Alkalinity, as $CaCO_3$	200	mg/L
pH	7.8	pH s.u.
Specific Conductivity	1,060	umho/cm
Chloride	187	mg/L
Sulfate	35	mg/L
Nitrate, as NO_3	0	mg/L
Fluoride	1	mg/L
Iron	0	mg/L
Manganese	0.002	mg/L
Total Dissolved Solids	551	mg/L
Arsenic	0.0002	mg/L
Barium	0.4	mg/L
Selenium	0	mg/L
Silica	11.2	mg/L
Aluminum	1	ug/L
Potassium	5	mg/L
Zinc	0.008	mg/L
Corrosivity	0.274	LANG
Gross Alpha	9	pCi/L
Radium 226	3	pCi/L
Radium 228	<1.0	pCi/L
Hydrogen Sulfide Gas	4.0-11.0	ppmv
Total Trihalomethanes (TTHM)	0.0027	mg/L
Haloacetic Acids (HAA5)	0.004	mg/L

The following portion of the report explains waste streams produced from the existing water treatment plant and the addition of the H_2S air scrubber unit.

A. Existing Water Treatment Plant

Waste streams from the existing water treatment plant before the addition of the proposed H_2S Air Scrubber unit are as follows:

1. Filter Backwash Waste

- Four gravity filters, 9'x10', each backwashed at an average rate of 10 gpm/ft^2, for 10 minutes. (9'x10') x (10gpm/ft^2) x (10 min.) = 9,000 gallons per filter per backwash. Each filter is backwashed once a week, one filter at a time. A total of 36,000 gallons of backwash water per week.

- Filter Backwash water is discharged to the Filter Backwash Waste Sump which pumps waste to existing sanitary sewer collection system at a rate of 250 gpm.

2. Chlorine Contact Basin

- The chlorine contact basis does not have a drain.

- It is pumped out once every 5 to 8 years. Water is pumped out to the Filter Backwash Waste Sump and then pumped to the sanitary sewer collection system. The settlement in the basin is taken to the landfill.

3. Chemical Feed Points

- Chlorine (Cl_2) is fed at aerators discharge for disinfection and to oxidize any leftover H_2S after aeration. Feed rate is 3 mg/L or 12 pounds per day based on average day flow.

- Chlorine is also fed for disinfection where treated water enters the clearwell. Feed rate is 3 mg/L or 12 pounds per day based on average day flow.

- No waste streams are generated from chemical feed equipment.

4. Filter Backwash Waste Sump

- Waste is pumped to existing sanitary sewer collection system at a rate of 250 gpm.

- Average flow is 5 gpm per day based on total waste flow over one week of plant operation.

- The Filter Backwash Waste Sump is the only connection from the water treatment plant process water to the existing sanitary sewer collection system.

- The Filter Backwash Waste Sump pumps to a manhole in the existing sanitary sewer collection system.

5. Domestic Waste

- Domestic waste from the existing water treatment plant consists of one floor drain and sink in the laboratory, along with one toilet and sink in the bathroom.

- All domestic waste from the water treatment plant is gravity flow to the existing sanitary sewer collection system on the north side of the water treatment plant building. This domestic waste exits the building on the north west corner.

- There are no chemicals sent to the sanitary sewer collection system from the domestic waste stream.

- Domestic waste and process waste are not connected.

B. Water Treatment Plant with Improvements and H_2S Air Scrubber

1. Waste Stream from Water Treatment Plant with Improvements

- With the water treatment plant improvements, there will be no change in waste stream flow from existing plant, however the H_2S Air Scrubber will produce an additional waste stream as noted below.

2. Hydrogen Sulfide (H_2S) Air Scrubber - Chemical Feed Point

- H_2S chemicals include 6 gallons per hour of 25% Sodium Hydroxide (NaOH) and 42 gallons per hour of 12.5% Sodium Hypochlorite (NaOCl).

3. Hydrogen Sulfide (H_2S) Air Scrubber - Waste Stream

- Waste flow from the Hydrogen Sulfide Air Scrubber unit blowdown consists of 3 gpm during plant run time. (3 gpm) x (60 minutes/hour) x (11.5 hours/day) = 2,070 gallons per day.

- The maximum waste stream produces 3% Sodium Chloride (NaCl) and 2% Sodium Sulfate (Na_2SO_4), which is 518 lbs./day and 345 lbs./day, respectively.

- Above waste stream from scrubber unit is based on 11 ppm H_2S in well water. Past tests of well water have had 4 to 11 ppm H_2S. The high tests were from original Well No. 1, which has been abandoned due to high H_2S.

(The remainder of this page intentionally left blank)

C. Summary of Waste Streams

All waste streams after plant improvements are completed will be discharged and flow through the City's existing sanitary sewer collection system to the waste stabilization ponds for treatment. Process waste streams flow into the existing Filter Backwash Waste Sump and then pumped to an existing manhole in the sanitary sewer collection system. The domestic waste stream exits the building to the north and gravity flow to the existing sanitary sewer collection system along McKay street. Figure 2 attached herein shows the disposal route to the City's existing waste stabilization pond treatment system, where all

[redacted]

Basin. There is no adverse effect on the City's sewer system or treatment facilities from improved water treatment plant waste streams, and no significant increase in waste treatment cost.

Water Plant with addition of Hydrogen Sulfide (H_2S) Removal

[redacted]

*All average flows per day are based on flow over 365 days per year, 700 gpm treatment rate and 11.5 hours of plant operation per day.

Respectfully Submitted,

KRAMER CONSULTING, LLC

Josh B. Kramer, E.I.T.
Engineering Tech

KRAMER CONSULTING, LLC

John P. "Jack" Kramer, P.E.
Principal

[redacted]

[redacted]